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(54) Title: **HEAT STABLE VARIANTS OF ADENOSINE DIPHOSPHATE GLUCOSE PYROPHOSPHORYLASE**

(57) **Abstract:** The subject invention concerns polynucleotides encoding a small subunit of plant AGP having one or more mutations in the amino acid sequence wherein the mutation confers increased heat stability to the expressed AGP enzyme. Mutations in the N-terminus of the small subunit of heat labile plant AGP results in AGP enzymes that are significantly more heat stable compared to wild type AGP in that the mutant AGP retains significant levels of enzymatic activity following exposure to heat treatment. In one embodiment, the polynucleotide encodes a mutant small subunit of maize AGP. The subject invention also concerns methods for providing a plant with increased resistance to heat conditions. Plants with heat labile AGP can be transformed with a polynucleotide of the present invention. The subject invention also concerns these transformed plants and transgenic progeny thereof. The subject invention also concerns mutant polypeptides encoded by polynucleotides of the present invention.

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